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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/600,985	06/20/2003	Kurt R. Carlson	NGC-139/000009-199	7136

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EXAMINER	
KALIVODA, CHRISTOPHER M	
ART UNIT	PAPER NUMBER
2881	

DATE MAILED: 04/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/600,985	CARLSON ET AL.	
	Examiner	Art Unit	
	Christopher M. Kalivoda	2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 June 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *06/20/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 2, 3, 11, 17 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application 2001/0000930 A1 to Kim. Regarding independent claims 1 and 17 as claimed, Kim describes an apparatus or method comprising a polymeric material (abstract, lines 1-3) that abuts one or more sensor fibers (para 0094, lines 1-4 and Fig 6, ref sign 222 and 224) wherein the polymeric material has a plurality of voids (para 0043, lines 1-5) wherein upon introduction of an applied force to a portion of the polymeric material, the voids compress to allow a portion of the polymeric material to absorb a portion of the applied force a promote a decrease of a reaction force from a portion of the polymeric material to one or more of the sensor fibers (para 0046, lines 1-6). While the reference does not specifically mention the voids compressing to reduce the reaction force, it is implied since the polymers/fiber pass a crush test.

Regarding dependent claims 2, 3, 11 and 22, the strain in the fiber (and pressure on the fiber) is reduced since the fiber passes the crush test (para 0046, lines 1-6). The

bulk modulus reduces due to the presence of voids (para 0043, lines 1-5). In addition, the distribution of the voids can be substantially uniform (para 004, lines 1-4 and 0053, lines 1-4).

2. Claims 4 – 10, 12 – 14, and 18 - 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application 2001/0000930 A1 to Kim in view of Cordova et al., U.S. Patent 5,546,482. Regarding claims 4 - 10, 12 - 14, and 18 - 20, Kim teaches the limitations of claims 1 and 17 as described above.

However, the reference is silent with respect to the polymeric material comprising potting compound encapsulating the sensor fibers, the fiber sensors comprising a sensor fiber coil, the potting compound encapsulating the sensor fiber coil, a first coil portion and a second coil portion with the potting compound separating the portions, the voids compressing to reduce the reaction force from the portion of the potting compound to the first coil portion wherein the reaction force is generated in response to the applied force from the second coil portion or wherein the reaction force is generated in response to the applied force from the first coil portion, upon expansion of the sensor fiber coil, the first coil portion and second coil portion exert a force on the potting compound, the voids compress to reduce the strain, the first and second coil portion comprise adjacent layers of the sensor fiber coil and are separated by a distance and the diameter of the voids is smaller than that distance. The reference is also silent with respect to the sensor fiber coil being part of a fiber optic gyroscope and the fiber coil

senses the rate of rotation, the compression of the voids promotes a decrease in the rotation sensing bias error through promotion of a decrease in a pressure on the sensor fiber coil.

Regarding claims 5, 6 and 12, Cordova et al. teach an apparatus comprising a polymeric potting compound encapsulating sensor fibers (col 2, lines 46-49 and Fig 2, ref signs 16 and 12), the fiber sensors comprise a sensor fiber coil (col 3, lines 41-42 and Fig 1), the polymeric potting compound encapsulates the sensor fiber coil (Fig 2, ref signs 16 and 12), a first coil portion and a second coil portion with the potting compound separating the portions (Fig 2). The sensor fiber coil is part of a fiber optic gyroscope and the fiber coil senses the rate of rotation (col 3, lines 42-45).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the invention of Cordova et al. by using voids taught by Kim in the potting compound.

The motivation for using the polymeric compound with voids as the potting compound in Cordova is to protect the fibers of the sensor coil from damage (see Kim para 0046, lines 1-6).

Regarding claims 4, 7 – 10, 13, 14, and 18 - 20 as such, Cordova et al. teach that environmental factors such a temperature lead to bias errors (col 1, lines 35-37).

While not described in the text, these errors are caused by strains/pressures on the fibers that naturally arise from thermal expansion/contraction. While the reference does also not specifically mention the voids compressing to reduce thermal pressure, it is implied since the polymer passes a crush test as described above. The voids thus serve to reduce strains/pressures on the fiber. The voids also compress to reduce the reaction force from a portion of the potting compound to the first coil portion wherein the reaction force is generated in response to an applied force from the second coil portion or wherein the reaction force is generated in response to the applied force from the first coil portion (see Kim para 0046, lines 1-6) since the polymer compound passes a crush test due to the voids as described above. Upon expansion of the sensor fiber coil, the first coil portion and second coil portion exert a force on the potting compound (col 4, lines 6-8) and the voids compress to reduce the strain for the same reasons given above. The first and second coil portions comprise adjacent layers of the sensor fiber coil and are separated by a distance (see Cordova et al., Fig 2) and the diameter of the voids is smaller than that distance (see Cordova et al. Fig 2 and Kim para 0042, lines 1-3). The compression of the voids promotes a decrease in the rotation sensing bias error (col 1, lines 35-38) through promotion of a decrease in a pressure on the sensor fiber coil. As mentioned above, when the fibers expand, such as that due to heating, the strain/pressure is reduced thus decreasing the bias error.

3. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application 2001/0000930 A1 to Kim in view of Cordova et al., U.S. Patent

5,742,390. Regarding claim 21, Kim teaches the limitations of claim 17 as described above.

However, the reference is silent with respect to the polymeric material comprising a potting compound and the step of buffering the sensor fibers comprises applying a potting compound to one or more faces of a spool, winding the sensor fiber around the spool to generate a sensor fiber coil and buffering a coil portion of the sensor fiber coil from one or more support faces with the potting compound that comprises one or more voids.

Cordova et al. (U.S. Patent 5,742,390) describes a gyro sensor and method of potting the sensor fiber. The potting compound is polymeric (col 2, lines 35-37) and the step of buffering the sensor fibers comprises applying a potting compound to one or more faces of a spool (col 5, lines 66-67 and Fig 2, ref sign 14) and winding the sensor fiber around the spool to generate a sensor fiber coil (Fig 2).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the potting material of Cordova et al. (U.S. Patent 5,742,390) by using voids as taught by Kim and buffering the sensor fibers with a potting material comprising voids by applying a potting compound to one or more faces of a spool and winding the sensor fiber around the spool to generate a sensor fiber coil.

The motivation for using the polymeric compound with voids as the potting compound is to fabricate a sensor coil and protect the fibers of the sensor coil from damage due to crushing (see Kim para 0046, lines 1-6).

4. Claims 15 - 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cordova et al., U.S. Patent 5,546,482 in view of U.S. Patent Application 2001/0000930 A1 to Kim. Regarding claim 15, Cordova et al. teach a fiber optic sensing coil of a fiber optic gyroscope (col 3, lines 41-44 and Fig 1) wherein one or more portions of the fiber optic sensing coil are coated with a potting material (col 2, lines 38-39 and Fig 2, ref sign 16). Furthermore, Cordova et al. teach that environmental factors such a temperature lead to bias errors (col 1, lines 35-37). While not described in the text, these errors are caused by strains on the fibers that arise from thermal expansion/contraction.

However, the reference is silent with respect to the potting material comprising a plurality of voids and wherein upon contact with the fiber optic sensing coil, the voids compress to promote a decrease in a strain on the fiber optic sensing coil wherein the decrease in strain promotes a decrease in a bias error of the fiber optic sensing coil.

Kim describes a polymeric material (abstract, lines 1-3) wherein the polymeric material has a plurality of voids (para 0043, lines 1-5). Upon introduction of an applied force to a portion of the polymeric material, the voids compress (para 0046, lines 1-6).

While the reference does not specifically mention the voids compressing to reduce strain, it is implied since the polymer passes a crush test. The voids thus serve to reduce strain on the fiber. Since the strain is reduced, bias errors are reduced.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the potting compound of Cordova et al. to include the voids of Kim.

The motivation for this improvement would be to reduce bias errors as described above.

Regarding claim 16, the sensing coil comprises one or more fibers wound upon a spool (see Cordova, et al. Fig 1) in a plurality of layers having a first and second layer (see Cordova et al. Fig 2) and the potting material (see Cordova, et al. Fig 2, ref sign 16) is between the first and second layers. The new potting material would have the voids of Kim as described above and decrease pressure between the layers since the voids compress as described above.

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher M. Kalivoda whose telephone number is

(571) 272-2476. The examiner can normally be reached on Monday - Friday (8:30 - 5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R. Lee can be reached on (571) 272-2477. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

6. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

cmk

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